

Figure 1

GENERAL INFORMATION

The Columbia Model 461 Tape Recorder is designed to record and play back two tracks of material on standard width recording tape, which doubles the playing time of a reel of tape with no loss of frequency response or quality. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker through use of the Output Jack.

Model 461 is designed for a tape velocity of 7 1/2" per second. Using both channels of the tape, the recording time is as follows:

Size Reel	Speed 7 1/2"
5" (600 ft.)	1/2 hour
7" (1200 ft.)	1 hour

This recorder is designed to operate on 60 cycle, 110-120 volts, AC supply only.

CAUTION: Severe Damage Will Result If Connection Is Made To A Direct Current (DC) Line.

Manufactured by:

Columbia Records
799 Seventh Avenue
New York, N.Y.

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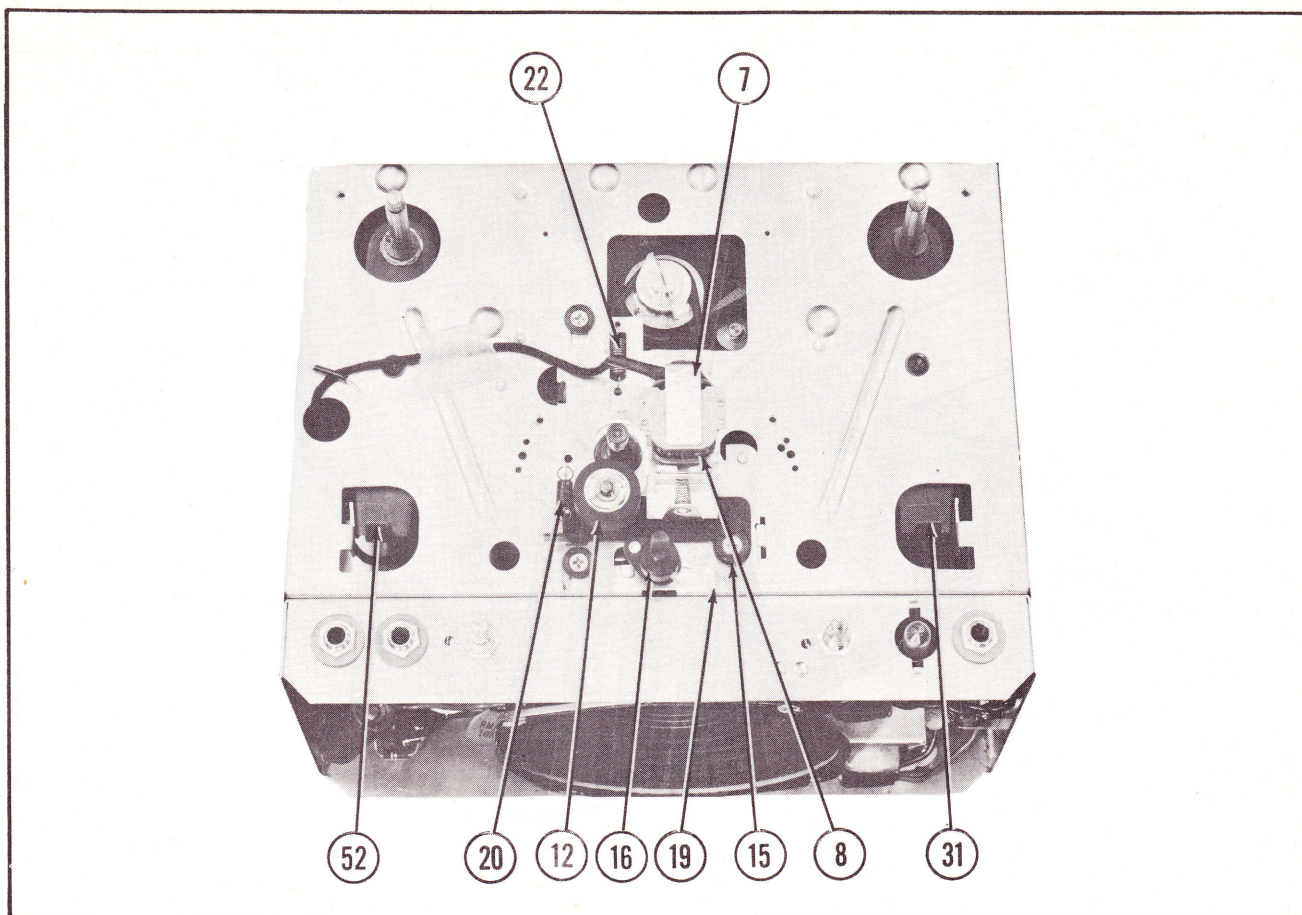


Figure 2

SPECIFICATIONS

Controls: On-Off Tone, Volume, Record-Playback, Fast Forward, Fast Rewind.

Tubes: 12AU7A, 12AX7, 6V6GT, 6X5.

Frequent Response: 65 to 10,000 cycle per second.

Power Requirements: 110-120 volts — 60 cycle A.C. only @ 70 watts.

Power Output: 2 watts undistorted — 3 watt maximum.

Inputs: Mike — 1 Meg.Imp., Radio-Phono. 5 Meg.Imp.

Output: Int. 5" Speaker, Ext. 3.2Ω Speaker, Ext. 1 Meg.Imp. for Ext. Amp. or Monitor in record.

Bias & Erase Frequency: 50KC.

OPERATING INSTRUCTIONS

Threading The Tape-

1. Place a reel of tape on the right reel plate (2A) and an empty reel on the left reel plate (2B) making sure the reel slots engage the pins on the reel plates.

2. Unwind about 10" of tape from the reel. Hold a section of the tape straight with both hands and insert the tape in the tape slot making sure the dull coated side faces the rear of the recorder.

3. Insert the free end of the tape into one of the three radial slots in the hub of the empty reel. Turn the reel several turns, clockwise, until the tape is secured to the reel and all slack is taken up between reels.

To Record From Microphone-

1. Turn the On-Off Tone Control clockwise until a click is heard and allow about thirty seconds for the tubes to warm up.

2. Insert the microphone plug into the "Mike" jack.

3. Depress the play-record control knob (3) as far as it will go, turn clockwise until it locks while holding it down.

4. Hold the microphone about six inches from your mouth and speak in a normal voice. Adjust the "Volume" control until the record level indicator flashes on the loudest sounds.

NOTE: Correct recording volume is very important. Too weak a signal, which does not cause the record level indicator to flash, will result in weak playback and high background noise. Too strong a signal, causing the level indicator to flash continuously, will result in distortion during playback.

To Record From Radio-

Recordings from a radio may be made by one of three ways:

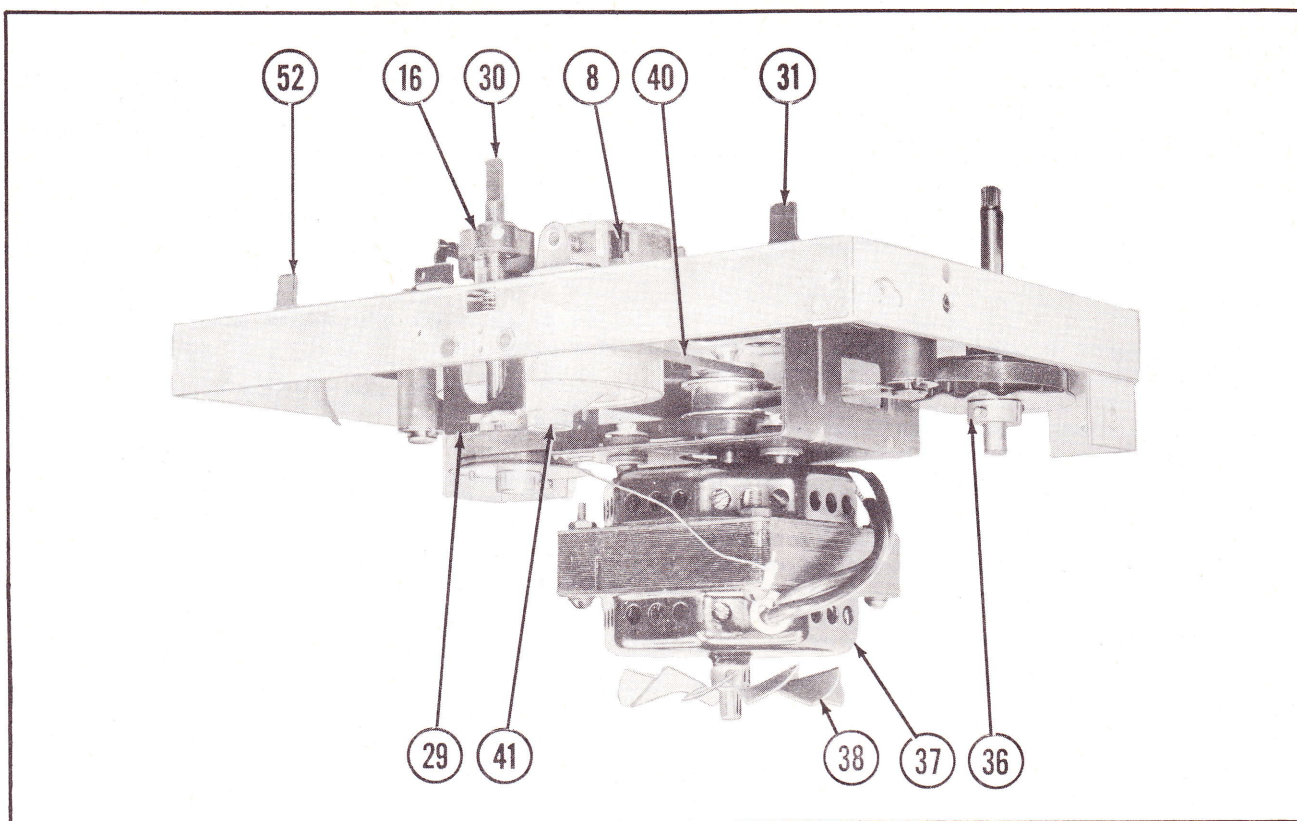


Figure 3

1. Place the microphone about 6" to 12" in front of the radio speaker. Turn the radio volume control to a normal level. Setting it too high will cause distortion. Turn the radio tone control to maximum treble. Set the recording level and proceed with recording as described under "To Record From Microphone". This type of recording may not be satisfactory as other sounds may be picked up by the microphone which as a result will be recorded on the tape.

2. Have a shielded cable made up with a two conductor phone plug on one end and two alligator clips on the other end. Connect the alligator clips across the voice coil terminals on the radio speaker and insert the cord plug into the "Radio-Phono" jack. Set the radio volume and tone controls as described above. Set the recording level and proceed as described under "To Record From Microphone".

3. Have a shielded cable with a two conductor phone plug on one end and the other end connected across the radio volume control. Insert the phone plug into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone." The position of the radio volume and tone controls has no effect on this setup and may be set anywhere.

To Record From Phonograph-

1. If the phonograph being used has a phone type plug on the pickup leads, insert it into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone".

2. If the phonograph has a standard pin type plug

which is more common, an adaptor is needed. Insert the pin plug into the adaptor and plug the adaptor into the "Radio-Phono" jack.

To Record From Television Receiver-

1. Use one of the three methods described under "To Record From Radio" and proceed with the recording as described under "To Record From Microphone".

Dual Track Recording-

The Columbia is designed so that only one-half the tape width is recorded at a time; thereby resulting in two track recording. This two track operation is accomplished in the following manner:

1. After a reel of tape has been recorded, i.e. all of the tape wound on to the tape-up reel, turn the play-record control (3) to idle.

2. Remove the reels from the recorder, turning the full reel over and placing it on the right reel plate (2A) and the empty reel on the left reel plate (2B).

3. Properly thread the tape and proceed with the recording.

4. After this track has been recorded the first track of recording is ready to be played without rewinding, by reversing the reels as described in step 2 above.

Fast Forward And Fast Rewind-

High speed forward or reverse can be obtained by pressing the desired knob (4A or 4B) toward the

head cover. Movement of these controls will wind the tape on the desired reel at a high speed as long as the control is held in this position. These are used primarily in locating a desired portion of a recording in a few seconds.

CAUTION: Do not attempt "Fast Forward" or "Fast Rewind" with the play-record control (3) on anything but idle position, as damage to the unit or breaking of the tape may result.

Braking-

The Columbia is equipped with a quick stop when in high speed, either direction. Move both "Fast Forward" and "Fast Rewind" controls toward the head cover and then release both at the same time. For example: when in fast forward speed, continue to hold control and with the other hand move "Fast Rewind" control toward head cover. When machine stops, release both controls at the same time. If a coasting stop is desired, release control in motion and tape will glide to a momentum stop.

To Play A Recording-

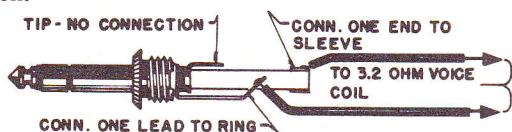
1. Thread tape as described under "Threading The Tape".

2. Turn play-record control (3) clockwise without depressing until it locks.

3. Adjust the "Volume" and "Tone" controls for desired listening level.

To Use An External Speaker-

1. You may want to use a larger speaker than the one in the recorder. To do this you will need a three conductor phone plug connected as shown in sketch.



2. Plug this into the Output jack and play the recorder thru the external speaker. The internal speaker is cut off.

CAUTION: Do not connect three conductor plug into Output jack without external speaker attached; as damage to the output tube, transformer, and "Tone Control" may result.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. For best results, cut tape at a slight diagonal, join ends together with splicing tape on the glossy side and trim off any excessive width.

Erasing Recorded Material-

In the record position any recording on the tape is automatically erased before a new recording is put on the tape. If it is desired to erase a recording without putting anything on the tape follow the normal recording procedure, but leave the "Volume" control set at its extreme counterclockwise position.

To Use As A Public Address System-

1. Insert the microphone plug into the "Radio-Phono" jack.

2. Leave the play-record control (3) in idle position.

3. Speak into the microphone and adjust the "Volume" and "Tone" controls for desired level.

4. Do not have the microphone too close to the speaker or a feedback howl will result.

ADJUSTMENTS

Removing Unit From Case-

All service work except cleaning of the head and pressure roller and adjustment of the head and pressure pad assembly require removal of the unit from the carrying case.

1. To remove unit from carrying case, disconnect power cord and remove the four phillips head screws from bottom of case and carefully lift unit straight up and out.

Spindle (9A and 9B) End Play Adjustments-

The spindles should have from 1/32" to 1/16" of up and down movement. Loosen the set screw in the pulley (36 or 47) and move the pulley up or down until the correct amount of end play is obtained.

Tape Up And Feed Reel Drag Adjustment-

When the play-record control (3) is released, the reels should stop right away to prevent looping of the tape. Also when in fast forward or rewind and the control is released the reels should coast to a stop without looping the tape. The stop arms on the motor-board (point "B" on exploded view) that the take-up and feed reel arms (31 and 52) rest against when the tape is not moving are what govern this. The stop arms should be bent to force the take-up reel arm (52) and the feed reel arm (31) over for enough to take up enough belt tension so that the spindles just start to revolve without the reels in place. The play-record control (3) should be in its extreme counterclockwise position when making this adjustment. With the reels in place the spindles should not revolve. If one or the other dose, force the stop arm (point "B" on exploded view) over until it stops revolving.

Lifter Arm (16) Adjustment-

This adjusts the distance that the contact strip on the play-record switch will move when going into the record position. If an adjustment is necessary,

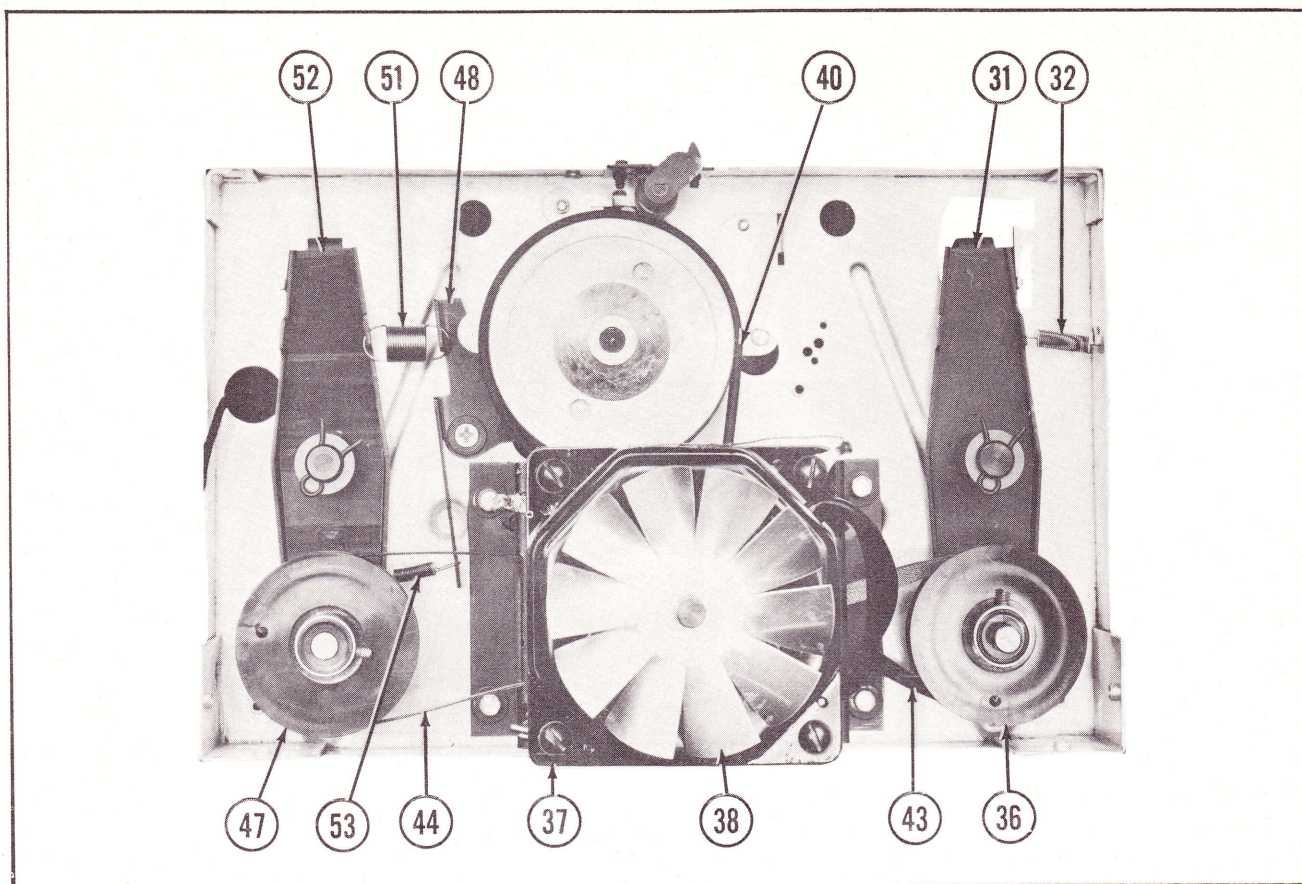


Figure 4

depress and turn the play-record control (3) clockwise. Loosen the set screw in the lifter arm (16) and rotate control knob (3) to the left or right to center the contact strip with the contacts on the left end of the switch. Make sure lifter arm (16) is down as far as it will go and tighten its set screw.

Play-Record-Erase Head Adjustment-

It is very important that the head (8) be lined up perfectly with the tape. If it is not, low output, loss of high frequencies, or track overlap may result. If head (8) requires replacement the complete assembly comprised of head (8) and head holder (7) should be replaced. The head holder (7) is adjusted individually to each head (8) and sealed at the factory. When installing head (8) observe the following precautions:

1. One is the head height. This is set by placing a .179" gauge (between 11/64" and 3/16") near the mounting bracket and between base plate (25) and bottom of head holder (7). Push down on head (8) and tighten screw (26). Withdraw gauge.

2. The second adjustment is for output and frequency response. To make this adjustment a tape on which a 3000 cycle note has been recorded by a unit known to be in good operating condition will be required. Connect an output meter or an A.C. voltmeter across the speaker voice coil of the unit to be adjusted. While playing back the 3000 cycle note tape, pivot head (8) back and forth on mounting screw (26) until maximum amplitude on output meter is achieved. Make sure that head (8) has not changed its height.

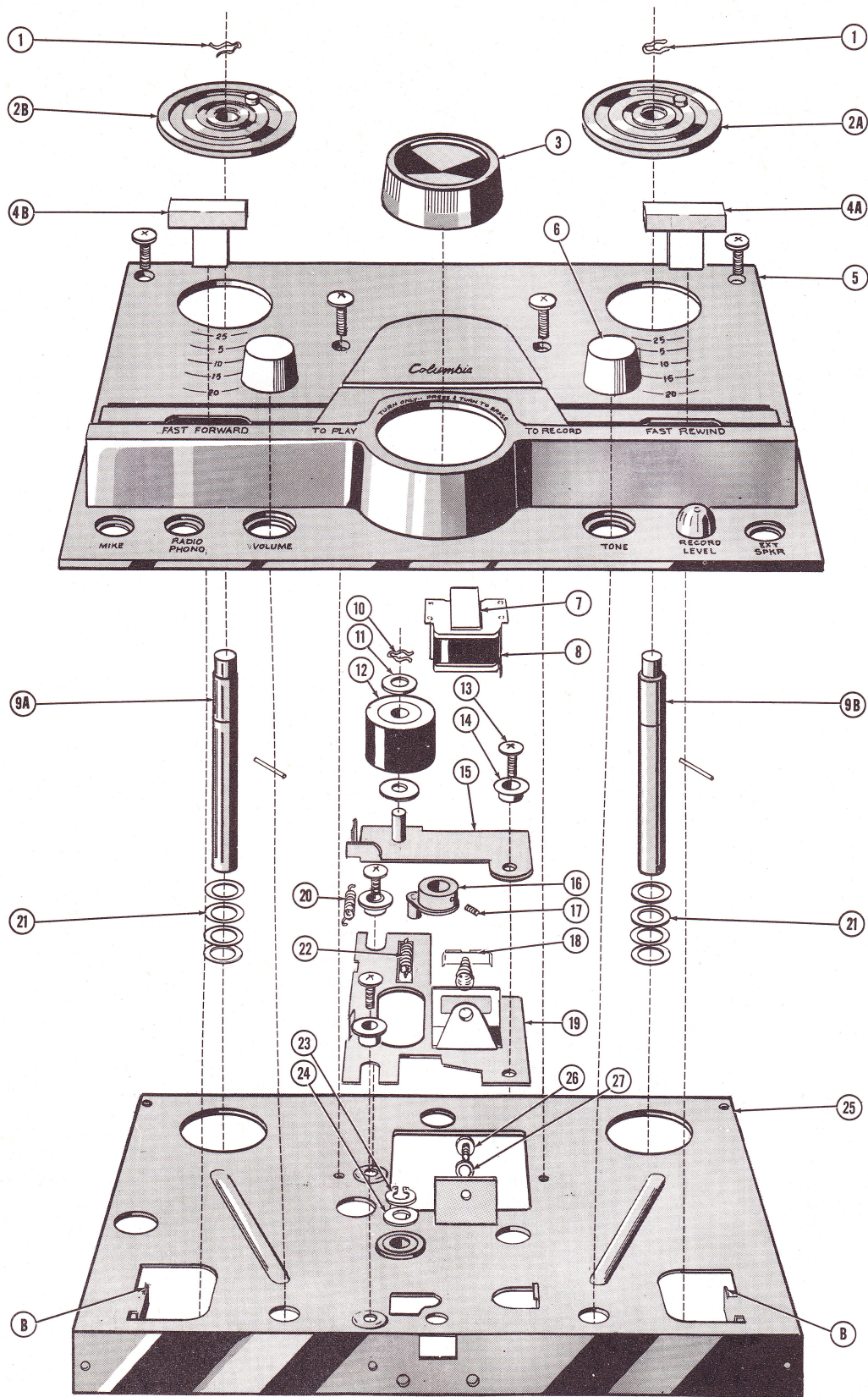
If a 3000 cycle note tape cannot be made, use a recording with high note content and make the adjustment described above.

3. Track overlap, this should be checked by first making a recording on a blank tape with the unit being checked. Do not rewind the tape, but merely reverse the reels and playback the other track. There should be no sound but, if what is heard is backwards, there is track overlap. To correct this, it will be necessary to adjust the tape guide on side of head holder (7) by bending it upwards. This should move the tracks further apart.

NOTE: When ordering a replacement head, be sure to get the complete assembly of head, plug and bracket. The bracket is adjusted to the individual head and sealed at the factory. Also, when ordering a replacement motor, be sure to get the complete assembly of motor, pulley and plug. The pulley is turned down on the individual motor and is not interchangeable.

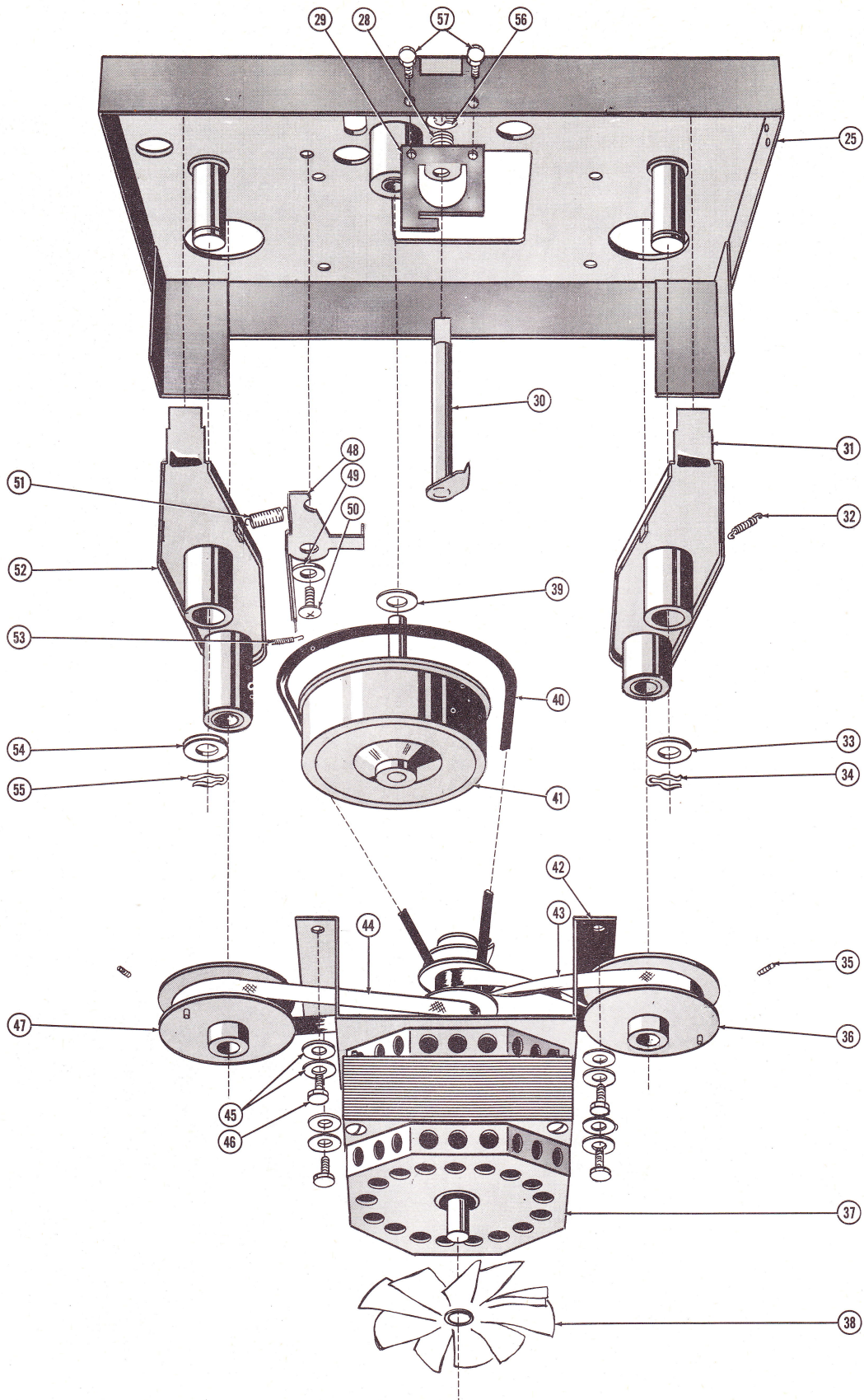
Hum Balance Adjustment-

If tube V1 or V2 is replaced or the head changed the setting of the hum balance pot (R3) should be checked. To do this, connect an external speaker to the unit as described under "To Use An External Speaker". Connect an A.C. voltmeter with a .1 volt A.C. scale across the speaker voice coil. Turn the "Volume" and "Tone" controls clockwise. Place the play-record control (3) in "Play" position. Put the



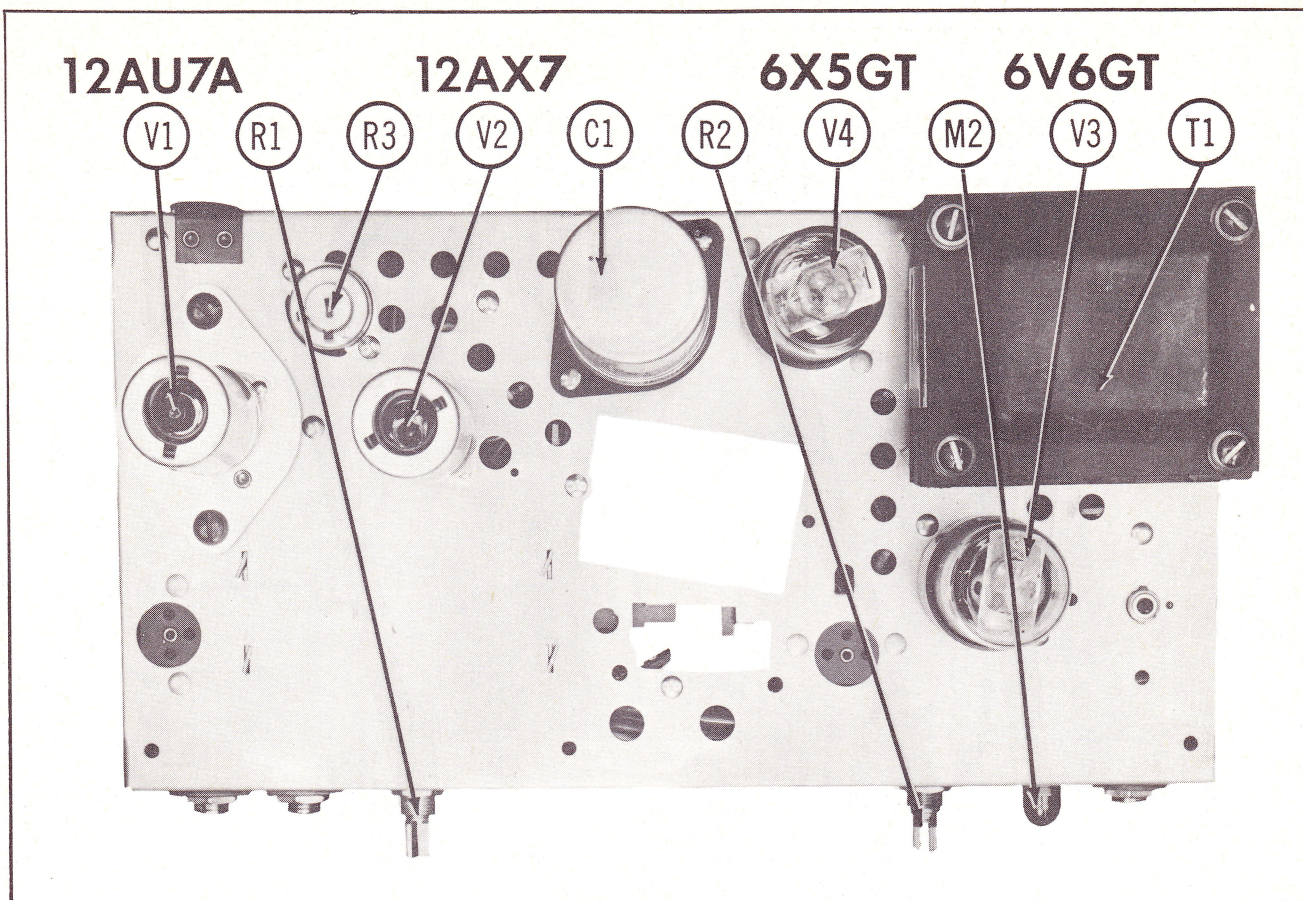
A PHOTOFAC "EXPLODED" VIEW
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Figure 5A. Exploded View Of Parts Above Baseplate.

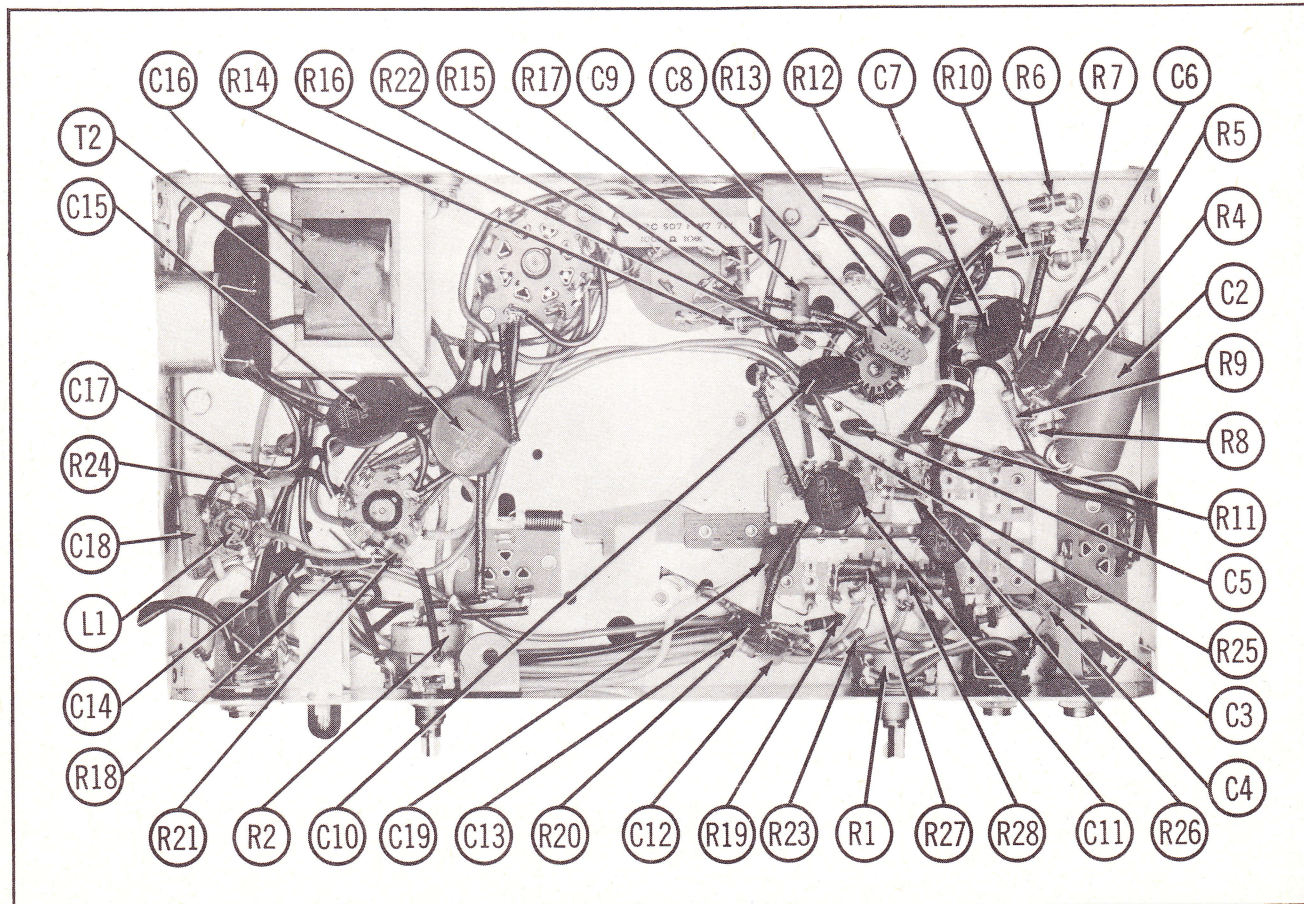


A PHOTOFACT "EXPLODED" VIEW
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Figure 5B. Exploded View Of Parts Below Baseplate.



Top View Of Amp. Chassis.



Bottom View Of Amp. Chassis.



† MEASURED FROM PIN 8 OF V4.

* MEASURED IN PLAY POSITION.
 † TAKEN IN RECORD POSITION IN

ALL MEASUREMENTS TAKEN IN RECORD POSITION UNLESS OTHERWISE DESIGNATED.

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A.C. meter on the .1 volt scale and adjust the hum pot. (R3), which is located between tubes V1 and V2 on top of the chassis, to its minimum reading. It should not exceed .1 volt. This is the only adjustment required in the amplifier.

LUBRICATION

The lubricants applied at time of manufacture should be sufficient for a long period of time. Approximately once a year, or in the event that parts are replaced, lubricate the unit as follows:

With No. 20 Motor Oil-

1. Take-up reel arm (52) bushing.
2. Feed reel arm (31) bushing.
3. Spindle (9A and 9B) bearings.
4. Flywheel (41) bearings.

With Statut No. 312 Grease Or Lubriplate-

1. Pressure plate (19) at the slide button and the guide on the right side.
2. On the stud of the lifter arm (16).

CAUTION: Do not oil the motor bearings unless absolutely necessary as excess oil will only be thrown off and cause slipping of the pulleys and rollers. Always use as little oil as possible. If oil should get on the pulleys and rollers wipe off with a petroleum solvent, such as alcohol. Do not use carbon-tetrachloride.

TROUBLES

Won't Take Up Tape Properly-

1. Spindle (9A) binding.
(a) Lubricate.
2. Belt (44) slipping.
(a) Clean motor pulley and pulley (47).
3. Belt (44) broken.
(a) Remove bracket (42) and replace belt.
4. Set screw loose in pulley (47).
(a) Tighten and leave 1/32" to 1/16" end play in spindle.
5. Pulley (47) broken.
(a) Replace pulley.

Fast Forward Won't Function Properly-

1. See above except for step 2.

Fast Rewind Won't Function Properly-

1. Spindle (9A or 9B) binding.
2. Belt (43) slipping.
(a) Clean motor pulley and pulley (36).
3. Belt (43) broken.
(a) Remove bracket (42) and replace belt.
4. Set screw loose in pulley (36).
(a) Tighten and leave 1/32" to 1/16" end play in spindle.
5. Pulley (36) broken.
(a) Replace pulley.

Speed Variation Or Wow-

1. Slippage
(a) Clean motor pulley, flywheel and capstan (41) and pressure roller (12) with a petroleum solvent, not carbon-tetrachloride. Replace rubber rollers if they appear oil soaked.
2. Too much feed reel drag.
(a) Check adjustment as described under "Take-Up And Feed Reel Drag Adjustment".
3. Flat spot on rubber roller (12).
(a) A rapid thumping sound while the unit is running may indicate a flat spot on the rubber tire. If this condition does not clear up after several minutes of running time replace the roller.
(b) If the surface of the rubber roller is not smooth and even, replace the part.
(c) Should the bearings on the rollers show signs of excessive wear or be extremely wobbly, the rollers should be replaced.
4. Tight feed of take-up spindle (9A or 9B).
(a) Check adjustment as described under "Spindle End Play Adjustment".
(b) Lubricate.
5. Tight pressure roller (12).
(a) Lubricate.
6. Tight flywheel shaft (41).
(a) Lubricate.

Tape Creeps Out Of Slot-

1. Head (8) improperly adjusted.
(a) "See" Play-Record-Erase Head Adjustment."

CLEANING

The record playback head (8), capstan shaft and pressure roller (12) are subject to an accumulation of tape coating residue, which is worn off the tape as it passes these parts. This can cause distortion, weak output and poor erasure. Use a soft cloth and alcohol to clean the bead surfaces; capstan and pressure roller.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	460162	Reel Holder Retainer	29	100660	Control Shaft Bracket
2A	310314	Feed Reel Holder	30	011723	Control Shaft
2B	310314	Take Up Reel Holder	31	011330	Rewind Arm
3	310300	Play-Record Knob	32	420173	Rewind Arm Brake Spring
4A	310299	Fast Rewind Knob	33	580156	Washer
4B	310299	Fast Forward Knob	34	460110	Retainer
5	012498	Top Plate	35	600247	Set Screw
6	310301	Volume & Tone Knobs	36	011317	Feed Reel Pulley
7		Head Holder (Part Of Head)	37	011692	Motor, 115V, 60 Cycle, Inc. Pulley, Cable & Plug.
8	011311	Head (inc. 7)	38	011321	Fan
9A	011319	Take Up Reel Spindle	39	580141	Washer
9B	011319	Feed Reel Spindle	40	490087	Rubber Belt
10	460111	Pressure Roller Retainer	41	011694	Flywheel & Shaft Assembly
11	580143	Cloth Washer	42	011739	Motor Mounting Bracket
12	011236	Pressure Roller	43	490089	Feed Reel Drive Belt
13	600243	Screw #6-32 x 1/4" (3)	44	490089	Take Up Reel Drive Belt
14	200288	Slide Button (3)	45	580056	Washer
15	012328	Pressure Roller Arm	46	600256	Screw
16	012329	Lifter Arm	47	011317	Take Up Reel Pulley
17	600247	Set Screw	48	100809	Take Up Lever
18	011316	Pressure Shoe, Inc. Felt Pads	49	200288	Washer
19	012381	Pressure Plate	50	600243	Screw
20	420174	Capstan Pressure Spring	51	420161	Take Up Spring
21	580141	Washer	52	011329	Take Up Arm
22	420171	Pressure Plate Spring	53	420172	Take Up Lever Brake Spring
23	460018	Shaft & Flywheel Retainer	54	580156	Washer
24	580141	Washer	55	460110	Retainer
25	012325	Base Plate	56	460117	Retainer
26	600137	Retains Head Screw	57	600111	Screws
27	580056	Washer			
28	420109	Record Release Spring			

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1		12AU7A, Pre-Amp.			@ 1500V.
V2		12AX7, AF Amp.	C15	770071	Cap. Ceramic Disc, 10000MMF
V3		6V6GT, Audio Output-Bias Osc.			@ 1500V.
V4		6X5GT, Rectifier	C16	770071	Cap. Ceramic Disc, 10000MMF
C1A	770088	Elect. Cap., 40MFD @ 300V.			@ 1500V.
C1B		Elect. Cap., 40MFD @ 300V.	C17	770090	Cap. Ceramic Disc, 470MMF
C1C		Elect. Cap., 40MFD @ 300V.			@ 400V.
C2	770003	Elect. Cap., 25MFD @ 25V.	C18		Cap. Mica, 3000MMF @ 400V.
C3	770097	Cap. Ceramic Disc, 75MMF	C19	770110	Cap. Ceramic, 2000MMF
		@ 400V.			@ 1500V.
C4	770090	Cap. Ceramic Disc, 470MMF	R1	740051	Volume Cont., 500K
		@ 400V.	R2	740052	Tone Cont. & Sw., 500K
C5	770090	Cap. Ceramic Disc, 470MMF	R3	740045	Hum Cont., 200Ω W. W.
		@ 400V.	R4	760001	Resistor, 1Meg, 1/2 W.
C6	770095	Cap. Ceramic Disc, 20000MMF	R5	760017	Resistor, 4.7K, 1/2 W.
		@ 500V.	R6	760036	Resistor, 220K, 1/2 W.
C7	770095	Cap. Ceramic Disc, 20000MMF	R7	760037	Resistor, 470K, 1/2 W.
		@ 500V.	R8	760037	Resistor, 470K, 1/2 W.
C8	770096	Cap. Ceramic Disc, 10000MMF	R9	760017	Resistor, 4.7K, 1/2 W.
		@ 500V.	R10	760036	Resistor, 220K, 1/2 W.
C9	770094	Cap. Ceramic Disc, 750MMF	R11	760003	Resistor, 1.5K, 1/2 W.
		@ 400V.	R12	760010	Resistor, 100K, 1/2 W.
C10	770095	Cap. Ceramic Disc, 20000MMF	R13	760052	Resistor, 270K, 1/2 W.
		@ 500V.	R14	760036	Resistor, 220K, 1/2 W.
C11	770095	Cap. Ceramic Disc, 20000MMF	R15	760047	Resistor, 2.2K, 1/2 W.
		@ 500V.	R16	760010	Resistor, 100K, 1/2 W.
C12	770097	Cap. Ceramic Disc, 75MMF	R17	760040	Resistor, 2.2Meg, 1/2 W.
		@ 400V.	R18	760040	Resistor, 2.2Meg, 1/2 W.
C13	770090	Cap. Ceramic Disc, 470MMF	R19	760001	Resistor, 1Meg, 1/2 W.
		@ 400V.	R20	760037	Resistor, 470K, 1/2 W.
C14	770110	Cap. Ceramic Disc, 20000MMF	R21	760019	Resistor, 10K, 1/2 W.

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ELECTRICAL PARTS LIST (Cont.)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
R22	760304	Resistor, 1000 Ω , 5 W.	T1	700054	Power Transformer
R23	760039	Resistor, 560K, 1/2 W.	T2	700055	Output Transformer
R24	760013	Resistor, 47K, 1/2 W.	L1	700080	Osc. , Coil
R25	760062	Resistor, 68K, 1/2 W.	M1	740053	Play-Record Switch
R26	760064	Resistor, 150K, 1/2 W.	M2	730006	Record Level, Lamp, Neon
R27	760054	Resistor, 5.6Meg, 1/2 W.			NE51
R28	760115	Resistor, 270 Ω , 1 W.	SP1		PM Speaker 5 1/4"